

P R O J E C T facts

DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

PETROLEUM EXPLORATION AND
PRODUCTION

09/2003

THE LOOMING CRISIS IN ENERGY - DOE Program contributes to education of future Geologists and Engineers

PARTNERS

**DOE Reservoir
Class Program**

Class I

Eleven Completed Projects

Class II

Nine Completed Projects

Class III

Nine Completed or Near
Completed Projects

Ten Projects Active or
Completed

MAIN SITE

**National Petroleum
Technology Office**

**National Energy
Technology Laboratory
Tulsa, OK**

BACKGROUND/PROBLEM

The domestic energy industry employment and consequently enrollment of petroleum engineers and geoscientists have been on a long steep decline for some time. An independent study conducted in 2002 by Dr. Mukul Sharma, chairman of the Department of Petroleum and Geosystems Engineering at the University of Texas, Austin presents a number of sobering statistics. The industry has reduced its workforce by 60% over the last 20 years. More alarming, the average age of the energy professional is now 50 and it is estimated that 50% of all professionals will retire in the next 5 years, at a time of declining enrollment in the energy programs in the universities. Indeed, the number of petroleum engineering schools has decreased from 34 in 1982 to 19 in 2000. Enrollment has decreased 83% in the same period. However, several leading engineering programs indicate their overall programs remained steady during the past 10 years thanks to the strength of their graduate programs. It is important to recognize the contribution the DOE programs have had to the university programs, and how vital it is that the agency continues to strengthen the schools to prepare them for the near and long term needs of industry.

PROJECT DESCRIPTION/ACCOMPLISHMENTS

To quantify the vital role the DOE plays in strengthening the university programs, a survey was taken of the university participants in the Reservoir Class Program, administered out of the National Energy Technology Laboratory in Tulsa, Oklahoma. The Reservoir Class program was initiated in 1993 to address the economic production of mature oil fields in the United States. The goals were to slow the rate of well abandonment, preserve the industry infrastructure and to increase ultimate recovery in known fields by demonstrating better methods of reservoir characterization, advanced oil recovery technologies and improved reservoir management. The Reservoir Class program grouped domestic reservoirs by the remaining volumes of oil to be recovered and the impending abandonment of domestic resources within these classes. One major component of the program was technology transfer with active workshops, presentations and publications to document the technologies and management strategies developed by the projects.

Forty-two projects were selected in four separate DOE solicitations from 1993 to 2000. Most projects ranged from 3 to five years and several will not be completed till 2006. Thirty-nine universities, 11 local and state agencies, 50 exploration and production companies and 46 service companies were involved in the projects. The benefits of the projects have paid high dividends in the form of taxes and royalties, increased reserves, incremental production, extended reservoir life, revitalization of leases, and jobs.



Engineering students learn drilling
technology at West Carney field, OK.



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BENEFITS/IMPACTS

Incidental to the successes of the 42 individual Class projects, the research conducted by the universities has provided valuable training experiences for undergraduate and graduate students.

Thirty-four of the universities and state geological surveys working as either principal investigators or participants utilized student resources: undergraduates, graduate students, post-doctoral researchers, labs and equipment. Undergraduate students were employed part time for specific tasks, but graduate students performed a significant part of the research. Based on a survey of 60% of the Class participants, the total program benefited the graduate students as follows:

135 Graduate students were supported for a two year program or longer

60 Faculty or research post-docs were supported for two years

45 Masters theses were based on this research

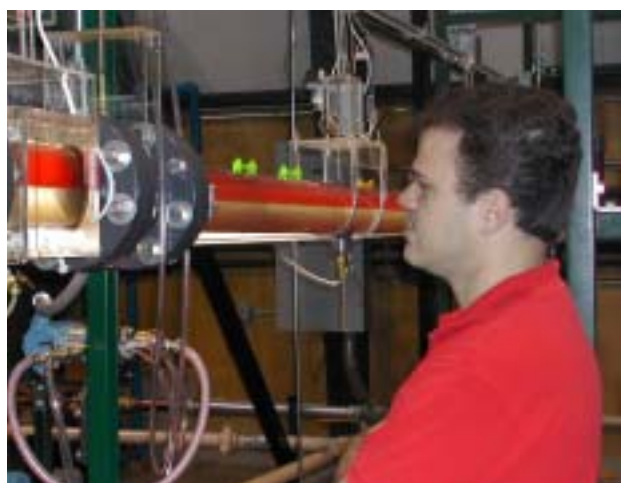
23 Doctoral dissertations were based on the research

75 Students were placed in industry jobs as a direct result of the program

Research at the universities and geological surveys developed numerous software programs and databases, which are available to future students and the public, and will continue to provide valuable resources for the petroleum industry. These benefits include:

- Dozens of models and databases of various fields and plays were placed in the public domain.
- Several specialized simulation software packages were created and made available to industry.
- Several successful protocols for coring and completions were documented and made available to industry.
- A number of labs for visualization, core research and other research facilities were created and are still in use in the teaching program.
- At least one core repository was created.
- Several full time faculty positions were added and remain.
- In Midland, TX a CO₂ technical conference was initiated and continues to be a valuable medium for exchanging technical information on CO₂ tertiary recovery.

The Reservoir Class program is only one of many DOE programs that fund research using graduate students, which contribute to the educational process and provide future research members to the petroleum industry.



University of Tulsa student working on oil/water segregation in pipe flow.

CONTACTS

Rhonda Jacobs

Project Manager

U.S. DOE

Phone: (918) 699-2037

E-mail: rhonda.jacobs@netl.doe.gov

Roy Long

Program Manager

U.S. DOE

Phone: (918) 699-2017

E-mail: roy.long@netl.doe.gov

TOTAL COST

\$331,000

COST SHARING

DOE - \$138,000

Non-DOE - \$193,000